ALTITUDE SICKNESS

FMST 0414
17 Dec 99

TERMINAL LEARNING OBJECTIVE:

1. Given an altitude sickness casualty in a combat environment (day or night) and the standard Field Medical Service Technician supplies and equipment, manage altitude sickness, per the references. (FMST.04.15)

ENABLING LEARNING OBJECTIVES.

1. Given a simulated casualty in a mountainous environment, treat Acute Mountain Sickness(AMS), in accordance with the student handbook. (FMST.04.15a)
2. Given a simulated casualty in a mountainous environment, treat, High Altitude Pulmonary Edema (HAPE), in accordance with the student handbook. (FMST. 04.15b)
3. Given a simulated casualty in a mountainous environment, treat, High Altitude Cerebral Edema (HACE), in accordance with the student handbook. (FMST.04.15c)
4. Without the aid of references define Acute Mountain Sickness, in accordance with the student handbook. (FMST.04.15d)
5. Without the aid of references and given a list, identify the six signs and symptoms of a patient afflicted with Acute Mountain Sickness (AMS), in accordance with the student handbook. (FMST.04.15f)
6. Without the aid of references and given a list, select the correct field treatments for Acute Mountain Sickness (AMS) in accordance with the student handbook. (FMST. 04.15g)
7. Without the aid of references and given a list, select the correct preventive measures for AMS, in Accordance with the student handbook. (FMST.04.15h)
8. Without the aid of references define High Altitude Pulmonary Edema (HAPE), in accordance with the student handbook. (FMST.04.15i)
9. Without the aid of references describe the later signs/symptoms of High Altitude Pulmonary Edema (HAPE), in accordance with the student handbook. (FMST.04.15j)
10. Without the aid of references define High Altitude Cerebral Edema (HACE), in accordance with the student handbook. (FMST.04.15k)
11. Without the aid of references identify the primary mechanism of High Altitude Cerebral Edema (HACE), in accordance with the student handbook. (FMST.04.15l)

OUTLINE:

A. **ACUTE MOUNTAIN SICKNESS (AMS)**

1. Definition: Acute mountain sickness is a medical condition caused by ascending to high altitudes at too rapidly a pace. The body does not have the opportunity to adjust to the decrease in oxygen concentration levels. Signs and symptoms are a direct result of hypoxia.
   a. AMS is rarely seen below 8,000 feet and will occur in most persons who rapidly ascend to altitudes greater than 10,000-12,000 feet in elevation.
   b. Aerobic fitness is not a predictor of getting AMS with exposure to altitude. There is some evidence that prior aerobic fitness leads to increased AMS

incidence most likely due to their body's.

c. Prior ascents to altitude without symptoms of AMS is not a guarantee of getting symptoms with re-ascent. Generally, there is no correlation between the severity of the illness and increasing altitudes. The incidence in males and females is the same and there is increased incidence in younger patients.

2. Signs and Symptoms of Acute Mountain Sickness:
   a. AMS tends to occur within the first 6-48 hours of reaching altitude and is more severe on the second and third day but rarely lasts more than six days. Symptoms include:
      1. Headache, usually throbbing, bitemporal or occipital, typically worse at night, upon awakening, and made worse by Valsalva manuever, or stooping over. This is the most common and prominent sign.
      2. Fatigue
      3. Dizziness
      4. Anorexia
      5. Respiratory difficulties
         a. Dyspnea on exertion (DOE)
         b. Cheyne-Stokes breathing
      6. Nausea
      7. Vomiting
      8. Warm and flushed feeling of the face
      9. Insomnia
      10. Palpatations and vague pains in the posterolateral chest
      11. Decreased capacity for mental work
      12. Tinnitus
      13. Memory defects
      14. Vertigo
      15. Ataxia may occur and it may be progressive**.**
          (The presence of ataxia is ominous and this is a clear indication for descent).

NOTE: AMS is commonly misdiagnosed as a viral flu-like illness, exhaustion, or dehydration.

3. Field Management:
   a. Descend. The individual should descend 1,000-3,000 feet, at which point the patient should have marked relief of symptoms.

   b. Overexertion: Avoid overexertion. Light duty.

   c. Fluids Adequate: Fluid replacement and a light diet.

   d. Pain Relievers: Mild analgesics such as Aspirin, Tylenol, or Motrin to treat the headache.

e. Hyperventilation. The victim can also hyperventilate for about one minute every 10-15 minutes while awake.

f. ALL PATIENTS WITH AMS SHOULD BE EVALUATED FOR HIGH ALTITUDE PULMONARY EDEMA (HAPE).

g. Do not allow the patient to use any tobacco products.

NOTE: Dizziness/numbness. Care must be taken not to hyperventilate to the point of getting dizzy or developing numbness and tingling fingers, toes, lips.

4. Prevention Measures:
   a. The key and best approach is:
      1. Staged ascent no higher than 8,000 feet the first day.
      2. Spend the next 24 hours resting.
      3. Continue the ascent at about 1,000 feet altitude gain per day.
      4. Avoid overexertion and tobacco use.
      5. Maintain adequate fluid intake.
      6. Use the "work high/sleep low" concept. This is called "Graded Ascent" which is the surest and safest way to prevent AMS. Day trips to higher altitude and sleeping at lower altitude allows for a slower ascent but allows for the body to adjust to altitude better.

B. **HIGH ALTITUDE PULMONARY EDEMA (HAPE)**

1. Definition: HAPE is a high altitude illness which is characterized by filling of the lungs with fluid.
   a. HAPE rarely occurs below 8,000 feet and usually occurs above 12,000 feet.

   b. Persons with history of previous attacks of HAPE are likely to have recurrent episodes with subsequent ascents.

   c. HAPE is more common in high altitude residents who return to sea level then return to altitude.

   d. Episodes that occur a 8,000 to 10,000 feet usually are related to heavy physical exertion.

   e. The incidence of HAPE is 13 times greater in the 20 to 29 year age group than the over 30 year age group.

2. Signs and Symptoms
   a. These tend to occur within 24-48 hours after arrival. Usually the symptoms of AMS are present before or occur with the symptoms of HAPE.

b. Early Signs:
   1. Dry cough, frequently occurring at night.
   2. Respiratory distress, made worse by exertion.
   3. Mild chest pain, usually perceived as an ache beneath the sternum.
   4. Weakness.

c. Later Signs:
   1. Cyanosis.
   2. Cough that produces large amounts of frothy, pink sputum.
   3. Rapid pulse and respirations.
   4. Audible gurgling sounds during breathing. When a stethoscope or ear is placed on the naked chest, wet-crackling sounds can be heard as the patient breathes.
   5. Severe respiratory distress.

3. Field Treatment:
   a) The most important emergency care measure is ***the immediate descent to a lower altitude*** since fatalities can occur within 6-12 hours in severe cases.

   b) Usually descent of at least 2,000-3,000 feet below the initial altitude is a definite treatment and will result in marked improvement.

   c) The patient should be placed in the most comfortable position (usually sitting) and given high concentration oxygen if available.

   d) Remember that the lungs are the target, support ventilation may be necessary when indicated.

   e) Treat headaches with mild analgesics such as Tylenol, Motrin, or Aspirin.

   f) Remember HAPE is a MEDICAL EMERGENCY and medevac must be URGENT.

4. Prevention Measures. The methods of prevention are identical to those outlined for AMS.

C. HIGH ALTITUDE CEREBRAL EDEMA (HACE)

1. Definition: HACE is a high altitude illness that is characterized by swelling of the brain.
   a. HACE can occur as low as 8,000 feet, but typically occurs at more than 12,000 feet.

   b. The incidence of HACE in persons brought rapidly to high altitudes is approximately 2%.

2. Mechanism of HACE
   a. Hypoxia causes cerebral vasodilatation and an increase in cerebral blood volume.

3. Signs and Symptoms:
   a. Early signs and symptoms:
      1. Headache, which usually is throbbing and may be severe.
      2. Nausea, vomiting.
      3. Insomnia.
      4. Cheyne-Stokes respirations.

   b. Later signs and symptoms:
      1. Ataxia (loss of muscle coordination leading to difficulty maintaining balance).
      2. Confusion, which may progress to stupor, coma and death without proper treatment.
      3. Paralysis of one or more extremities, which may resemble the paralysis seen in stroke.
      4. Blindness.
      5. Convulsions

   c. Many patients develop retinal hemorrhages, which can be seen with a opthalmoscope by suitable trained individuals. The patient is un-aware of the hemorrhages unless they are present in the parts of the retina responsible for sharpest vision (macula).

   d. The most important impediment to early recognition is its insidious onset. Early signs and symptoms frequently go unrecognized or are ignored by patients and their companions.

3. Field Treatment:
   a. Treatment should be immediate since fatalities can occur within a few hours in severe cases.
   b. Once diagnosed, the patient should be placed in the most comfortable position possible, descended immediately and should be administered high concentrations of oxygen if available.
   c. Medevac to a medical facility ASAP!

4. Prevention:
   a. Prevention is the same as discussed for AMS and HAPE.
   b. There is no known pharmacological agent for the prevention of HACE.

REFERENCES (S)

Wilderness Medicine, Management of Wilderness and Environmental Injuries